

## REMARKS

### **I. INTRODUCTION**

Claims 1-10 are pending in the present application. Applicants would like to thank the Examiner for indicating that claims 2-6 contain allowable subject matter. In view of the following remarks, however, Applicants respectfully submit that all presently pending claims are in condition for allowance.

The Applicants also thank the Examiner for the interview with their representative, Michael J. Marcin, on June 23, 2011.

### **II. THE 35 U.S.C. § 112 REJECTION SHOULD BE WITHDRAWN**

Claims 1-10 stand rejected under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. Specifically, the Examiner states that the recitation of “the registering including selecting at least one further first landmark in the first image and at least one further second landmark in the second image” is not supported by the specification. (*See* 4/20/11 Office Action, p. 3).

The Examiner asserts that the specification only provides support only for selecting at least one further landmark in the second image, but not the first. (*Id.* at p. 3). Applicants respectfully disagree and direct the Examiner’s attention to page 7, lines 24-27 of the originally filed application. This portion of the specification explains that after the images to be registered are acquired, a plurality “of significant landmarks  $\{L_i\}$  is selected in **both** images A and B, which can be unambiguously assigned or allotted to each other, i.e. which unambiguously correspond to each other.” So, it is clear that when a landmark is selected in one image, a corresponding landmark is selected in the other image. A similarity value S signifies the similarity of a simplex  $\{P_i\}$  in the floating image A to the reference image B. (*See* Specification, p. 9, ll. 7-12). Thus, when a landmark is selected in one image (A), a corresponding landmark is selected in the other image (B) so that a similarity (S) of the new simplex in both images can be determined.

Originally filed Figures 3-6 show the claimed method that is performed to both the first and the second image. However, these figures show the progression of the claimed method on **one and the same** image (either the first image or the second image). However, the steps shown in Figures 3-6 are performed on both images (A and B). So, in Fig. 5, when an additional landmark  $L_6$  is selected, that landmark is selected in both the first and the second images. The same concept applies to the addition landmark  $L_7$ . If a point is selected in the first image, a corresponding point must also be selected in the second image. One of ordinary skill in the art would understand that this process is necessary in order to determine a similarity between the first and the second images.

It appears based on the Office Action and the interview that the Examiner had interpreted the images in Figs. 3-6 to each be a separate image. (*See* 4/20/11 Office Action, p. 3). However, as explained above and during the interview, Figs. 3-6 represent the same image. Moreover, there is no physical change to the image in any of Figs. 3-6. The selection of the landmarks does not represent a physical change to the image, but rather a further processing of data that is always contained in the image. Thus, the landmarks and corresponding triangle edges shown in, for example, Fig. 5, are not actually shown in the image, but rather are an illustration of the processing that may be performed on the image data based on the exemplary embodiments. Thus, Figs. 3-6 represent only a single image.

Page 8, line 31 – page 10, line 10 of the originally filed specification explain the process and the reason for selecting a new landmark in both images. If, with the current landmarks (e.g. Fig. 4) a similarity measurement between the two images (A and B) is below a threshold, another landmark is chosen **in both image** (A and B) so that a new similarity measurement can be determined for a simplex (P) so that the new similarity measurement is at or above the predetermined threshold value. Without selecting a landmark in the first image and a corresponding landmark in the second image, the similarity cannot be determined for the new simplex created (e.g. in Fig. 5). Accordingly, Applicants respectfully request the withdrawal of the 35 U.S.C. § 112 rejection.

### III. THE 35 U.S.C. § 102(b) REJECTIONS SHOULD BE WITHDRAWN

Claims 1 and 8-10 stand rejected under 35 U.S.C. § 102(b) as anticipated by Pardas et al. (U.S. Published App. No. 2003/0048955).

Claim 1, recites, “[a] method of registering a first image and a second image, the method comprising the steps of: selecting, by an image processing device, at least one first landmark in the first image; selecting, by an image processing device, at least one second landmark in the second image, wherein the at least one first landmark corresponds to the at least one second landmark; and registering, by an image processing device, the first and second images by using a similarity value which relates to a similarity of a first region in the first image determined by the at least one first landmark and a second region in the second image determined by the at least one second landmark, *the registering including selecting at least one further first landmark in the first image and at least one further second landmark in the second image if the similarity value is less than a pre-selected value.*”

Prior to discussing Pardas, the Applicants refer the Examiner to the above description for the proper interpretation of the highlighted portion of the claim language. Again, the “*selecting at least one further first landmark in the first image*” is shown, for example, in Fig. 5, when landmark L6 is selected. However, as described above, the exact same “*selecting . . . at least one further second landmark in the second image*” is performed. This may also be illustrated by Fig. 5. That is, the same operation is performed to the two images, but Fig. 5 is only illustrating the operation on one of the images (either the first image or the second image).

Pardas discloses a method for coding a sequence of pictures using an active triangular mesh coding scheme and a partition tree. (See Pardas, Abstract). The method of Pardas begins with a block mesh whose mesh elements are subsequently divided into two triangles. (*Id.* at ¶ [0050]). Pardas discloses that new triangles must either be introduced (segmentation 141) or removed (merging 142) because of modifications of the scene content. (*Id.* at ¶ [0056]). There are two criteria used to determine which triangles

should be segmented in the segmentation step (141). The first is that one new edge of the triangle should follow the high gradient if a high gradient component of the signal crosses one of the triangle's edges. The second criterion is that a large triangle should be segmented into smaller triangles since the large triangle would most likely produce synthesis errors. (*Id.* at ¶ [0057]). The merging step (142) removes triangles that are either small or degenerated. (*Id.* at ¶ [0058]).

The Examiner refers to a reproduced version of Figure 20 of Pardas and states that “each set of mesh proposals in fig. 20 divides the underlying image into a plurality of images” and “each mesh...is its own image” to meet the recitations of claim 1. (*See* 4/20/11 Office Action, pp. 4-7). Applicants respectfully disagree with the Examiner's interpretation of Pardas and of Figure 20. Figure 20 merely displays the set of mesh proposals from the original projected mesh. (*See* Pardas, ¶ [0067], Fig. 20). There are five levels in Figure 20. The original projected mesh is the displayed at the middle level. Segmentation is displayed descending from the middle level. Merging is displayed ascending from the middle level. (*Id.* at ¶ [0067]). So, the two levels above the original projected mesh in the middle level are subsequent levels of the merging step. In the level directly above the original projected mesh, the two mesh elements at the right have been merged, resulting in one big element on the right and two smaller ones on the left. (*Id.*). The uppermost level is the result of a further merging step, which merges the remaining two elements that were on the left in the preceding level. So, the different levels in this figure are NOT different images. They are the same image, but after merging or segmentation. Performing merging or segmentation on an image does not make it a different image. Accordingly, Pardas fails to disclose or suggest “registering, by an image processing device, the first and second images by using a similarity value which relates to a similarity of a first region in the first image determined by the at least one first landmark and a second region in the second image determined by the at least one second landmark,” as recited in claim 1.

Furthermore, the Examiner states that determining whether a high gradient component of the signal crosses on edge of this triangle is a value (yes or no) and that the

determination of whether the triangle is of a very large size is also a value (yes or no). (See 4/20/11 Office Action, p. 5). In view of the above description of the claimed invention, these determinations are markedly different than the recitation in claim 1 of “a similarity of a first region in the first image determined by the at least one first landmark and a second region in the second image determined by the at least one second landmark.” That is, the determinations of Pardas are not with regards to two different images. It seems the Examiner tries to cure this deficiency by stating that the segmentation of a large triangle into two triangles creates a new image. (See *Id.*). Applicants respectfully disagree. One of ordinary skill in the art would not determine the similarity between the original triangle and the segmented triangle because it is clear that the segmented triangle is merely a modification of the original, larger triangle. Thus, Pardas does not disclose or suggest “registering, by an image processing device, the first and second images by using a similarity value which relates to a similarity of a first region in the first image determined by the at least one first landmark and a second region in the second image determined by the at least one second landmark, *the registering including selecting at least one further first landmark in the first image and at least one further second landmark in the second image if the similarity value is less than a pre-selected value.*” Accordingly, Applicants respectfully request the withdrawal of the 35 U.S.C. § 102(b) of claim 1 and its dependent claim 10.

Independent claims 8 and 9 recite a similar limitation as described above for claim 1. Accordingly, the 35 U.S.C. §102(b) rejection of these claims should be withdrawn.

Claims 1 and 8-10 stand rejected under 35 U.S.C. §102(b) for being anticipated by Erdem et al. (U.S. Patent 5,982,909). Claim 1 is cited above.

Erdem discloses tracking a predetermined, 2D portion of an image throughout a sequence of images. (See *Erdem*, Abstract). Erdem uses a reference frame (14) with mesh elements (22) and nodes (23). (*Id.* at col. 3, l. 53 – col. 4, l. 32, Figs. 2-4). Subsequently, this reference mesh is mapped onto a current frame (114). A mesh (121)

for the current frame is, thus, acquired with modified boundary elements (121) to properly fit the current frame. (*Id.* at col. 17, ll. 41-45, Fig. 20). Erdem discloses that “new inside and boundary nodes...are added to the mesh 121 half way on each link 140 that connect two nodes 123 in the mesh 121.” (*Id.* at, col. 17, ll. 46-49). Next, hexagonal search and corner refinement (50) is conducted to further refine the mesh.

The Examiner refers to Erdem’s addition of new inside and boundary nodes to meet the recitation of “*the registering including selecting at least one further first landmark in the first image and at least one further second landmark in the second image as a function of a pre-selected value of the similarity value*” in claim 1. Specifically, the Examiner states that the nodes in Fig. 20b which are not in Fig. 20a are equivalent to “*the registering including selecting at least one further first landmark in the first image*” and that the nodes in Fig. 20c which are not in Fig. 20b are equivalent to *at least one further second landmark in the second image as a function of a pre-selected value of the similarity value.*” Applicants respectfully disagree with the Examiner’s interpretation of Erdem. As previously stated, the reference mesh shown in Fig. 20a is tracked into the current frame (114), in which the current mesh (121) is obtained. (*See Erdem*, col. 17, ll. 41-45, Fig. 20). The new inside and boundary nodes (141) are added to this mesh in Fig. 20c. In view of the above description of the claimed invention, Applicants respectfully submit that the new inside and boundary nodes (141) are added to one and the same image and not a second image, as recited in claim 1.

Furthermore, the Examiner refers to the mean absolute difference (MAD) or mean square difference (MSE) and states that the MAD or MSE values that are not minimal values are the preselected values and the ones that are minimal values are less than the preselected values. (*See 4/20/11 Office Action*, p. 8). Applicants respectfully disagree. One of ordinary skill in the art would understand that a pre-selected value is a specific value (e.g. 1, 2, 3, etc.) chosen prior to the method of claim 1. The functionality suggested by the Examiner is merely a repetition of the process of Erdem to determine which position of G 51 minimizes the MAD or MSE (i.e. trial and error). It is respectfully submitted that Erdem does not disclose or suggest adding higher resolution

nodes if the MAD or MSE “*is less than a pre-selected value*,” as recited in claim 1. Accordingly, Applicants respectfully request the withdrawal of the 35 U.S.C. § 102(b) of claim 1 and its dependent claim 10.

Independent claims 8 and 9 recite similar limitations as described above for claim 1. Accordingly, the 35 U.S.C. §102(b) rejection of these claims should be withdrawn.

**III. THE 35 U.S.C. § 103(a) REJECTION SHOULD BE WITHDRAWN**

Claim 7 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Erdem in view of Moshfeghi (U.S. Patent 5,633,951).

Applicants respectfully submit that Moshfeghi fails to cure the above-mentioned deficiencies of Erdem and that Erdem and Moshfeghi, alone or together, fail to disclose or suggest “the registering including selecting at least one further first landmark in the first image *and at least one further second landmark in the second image as a function of a pre-selected value of the similarity value*,” as recited in claim 1. Because claim 7 depends on and, therefore, contains all of the limitations of claim 1, the withdrawal of the 35 U.S.C. § 103(a) of claim 7 is respectfully requested.

**CONCLUSION**

In light of the foregoing, Applicants respectfully submit that all of the presently pending claims are in condition for allowance. All issues raised by the Examiner having been addressed. An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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